

CHAPTER THREE

The Civil Works Program I: The Upper Mississippi

Meandering over 2,000 miles from Minnesota's Lake Itasca to the Gulf of Mexico, the Mississippi River was once described by Mark Twain as the "crookedest river in the world, ... not a commonplace river, but on the contrary ... in all ways remarkable."¹ The upper portion of the waterway, stretching from the river's headwaters to Guttenberg, Iowa, has rested under the purview of the Corps of Engineers since the early nineteenth century. Throughout these years, the Upper Mississippi has been a vital lifeline of commerce and recreation for the Midwest. It has also functioned as a center of biodiversity and cultural heritage. To facilitate the different functions of the river and to preserve environmental quality, the St. Paul District has the task of dredging, straightening and widening the river; of ensuring that residents in the Upper Mississippi River Basin have adequate flood protection; and of mitigating the environmental effects caused by these activities.

The district's navigation and flood control mission on the Upper Mississippi both fall under the umbrella of its civil works program. At the dawn of the twenty-first century, the civil works program was drastically different than in 1975. Laws such as the National Historic Preservation Act of 1966 and the National Environmental Policy Act of 1969, or NEPA, forced the Corps to become more environmentally conscious. Whereas large structures such as dams and reservoirs characterized the Corps' flood control efforts for much of the twentieth century, non-structural solutions were increasingly prevalent by 2000. Throughout the 1900s, the Corps dredged the Upper Mississippi River and other waterways with little consideration of the environmental effects on wildlife habitat and fish populations; but by 2000, the St. Paul District dredged far less than before, used the dredged material for constructive purposes and carried out an Environmental Management Program that restored habitat on the Upper Mississippi. In addition, although the federal government largely paid for most civil works projects, cost-sharing measures implemented in the 1980s shifted some of the expenses to local sponsors, allowing local participation and involvement and establishing high levels of trust and cooperation. But some critics charged that the Corps still had a long way to go in accepting environmental responsibility and pointed to the controversial Upper Mississippi River/Illinois Waterway Navigation Study, which supposedly used skewed benefit-cost analyses to justify extensive navigational developments on the Mississippi, as proof. Although there was some merit to the critics' contentions, it was clear that the Corps of Engineers generally and the St. Paul District specifically had made great changes in the last quarter of the twentieth century. As John Anfinson, former district historian, related, there was now "a much more open mind in St. Paul District as an organization to doing better by the



Dredging the river: A Corps' dredge in operation on the Upper Mississippi River. (Photo courtesy of St. Paul District, Corps of Engineers)

environment and [still] meeting the needs of people who want flood protection and navigation.”²

The Upper Mississippi River Basin Commission and GREAT I

After the passage of NEPA in 1969, the Corps faced numerous attacks from environmental organizations, such as the Sierra Club, for its alleged support of navigation interests on the Upper Mississippi and on the detrimental effects of its dredging program on fish and wildlife. Through leadership and cooperation on a number of studies and commissions about the Upper Mississippi, including the Great River Environmental Action Team, or GREAT, and the Upper Mississippi River Basin Commission, the St. Paul District gradually embraced its role as protector of the river. Although criticism came from all sides, the St. Paul District continued to try to balance the different uses of the river.

Even before NEPA passed, Congress decided the time had come to coordinate navigation interests with wildlife and fish habitat protection and appointed the Corps of Engineers as the leader in this management. In 1962, a resolution adopted by the Senate Committee on Public Works called for the development of “a comprehensive plan of improvement for the Upper Mississippi River Basin.” In response, the Corps initiated the Upper Mississippi River Comprehensive Basin Study, an examination of the river by an inter-agency committee chaired by the division engineer of the North Central Division. By the 1970s, this committee had morphed into the Upper Mississippi River Basin Coordinating Committee, containing representatives from the Departments of Agriculture, Commerce, Health, Education and Welfare, Housing and Urban Development, Interior and Transportation, as well as individuals from the Environmental Protection Agency and the Federal Power Commission. After consulting with seventy federal and state agencies about how to solve the water and land resource problems on the Upper Mississippi, the committee published its report in 1972, calling for “an orderly development of water and related land resources” through cooperation between federal, state and local agencies, including the Corps.³



Dredging the Mississippi River: The Dredge Hauser, a small dredge operated by the St. Paul District. (Photo courtesy of St. Paul District, Corps of Engineers)

Complementing the recommendations of the study was a request from several Upper Mississippi Basin governors for the completion of a river management plan. By executive order, President Richard Nixon established the Upper Mississippi River Basin Commission in 1972 to satisfy this demand. The commission immediately focused on the Corps’ nine-foot navigation channel. In the Rivers and Harbors Act of 1930, Congress authorized the Corps to dredge the Upper Mississippi to a depth of nine feet so that larger barges could traverse the river. During the years, the Corps often dredged three or four feet below the nine feet requirement in the interest of reducing the frequency of dredging operations. Along with the deeper dredging, the Corps constructed a series of twenty-nine locks and dams big enough for larger vessels.⁴ The pools created by the locks and the disposal of dredged material in side channels leading to open backwater areas accelerated sedimentation in backwaters. These backwaters served as important fish and wildlife habitat, so the loss of approximately twenty-five percent of these areas to marshlands heavily impacted fish and wildlife populations.⁵

According to Upper Mississippi River Basin Commission chairman George W. Griebenow, for years “commercial fishermen, biologists, and sportsmen ... expressed deep concern” over the Corps’ maintenance of the nine-foot channel. Their main complaint was that commercial navigation dominated the Upper Mississippi to the detriment of recreation and fish and wildlife management, even though Congress had established the Upper Mississippi River Wildlife and Fish Refuge in 1924 to preserve lands and waters for waterfowl.⁶ The situation intensified in the late 1960s and early 1970s, when the Upper Mississippi River Comprehensive Basin Study called for a twelve-foot channel and the Corps examined this possibility. Environmentalists worried that such deep dredging would cause the Mississippi to overflow into wetlands, that the increase in dredged disposal material would further damage already impaired wildlife habitats and that a deeper channel was not economically justified.⁷ The Corps did not disagree; in the early 1970s an EIS prepared by the Corps on the nine-foot channel revealed, in the words of two St. Paul District employees, that dredging and channel maintenance caused “significant damage to the fragile backwaters, marshes, and sloughs” of the Upper Mississippi. However, the Corps at that time seemed unable or unwilling to mitigate these effects, in part because of questions over whether it was authorized to alleviate the damage.⁸

Based on information gained from the EIS, Representatives Albert Quie (R-Minnesota) and Vernon Thomson (R-Wisconsin), together with the Minnesota/Wisconsin Boundary Area Commission, recommended the Upper Mississippi River Basin Commission delineate a river system management plan that would coordinate navigation, fish and wildlife interests, recreation, watershed management and water quality. At the same time, a lawsuit brought by the state of Wisconsin in the 1970s against the Corps temporarily halted dredging activities on the Upper Mississippi, convincing Congress that an investigation of dredging was needed. Congress appropriated \$375,000 for a study in 1974 and provided \$9.1 million more when it officially authorized the examination in the Water Resources Development Act of 1976. Upon the suggestion of the North Central Division of the Corps and the U.S. Fish and Wildlife Service, the Upper Mississippi River Basin Commission transformed its Dredged Spoil Disposal Practices Committee into the Great River Environmental Action Team, a collection of appointees from Iowa, Wisconsin and Minnesota, including representatives from the Corps, the U.S. Geological Survey, the Environmental Protection Agency, the Soil Conservation Service, the Bureau of Outdoor Recreation and the Department of Transportation, with members from other interested organizations serving as ex-officio members. William R. Pearson, the chief of special studies for the St. Paul District, co-chaired the study, which was divided into three parts: GREAT I examined the Upper Mississippi from the Twin Cities in Minnesota to Guttenberg, Iowa; GREAT II investigated the river from Guttenberg to the mouth of the Missouri River at Saverton, Missouri; and GREAT III studied the river from Saverton to its confluence with the Ohio River at Cairo, Illinois.⁹

From 1975 to 1980, GREAT I explored the question of how the St. Paul District’s navigation and dredging could be coordinated with other river uses. As two members of the study



Cooperation: The GREAT I study area. (Map courtesy of St. Paul District, Corps of Engineers)

related, because the team consisted of individuals from a variety of backgrounds, it was able to provide “a meaningful interdisciplinary approach through education and understanding of the many resources and physical factors involved with a river system so diverse as the Upper Mississippi.” In order to give different aspects of the river equal emphasis, the team divided into twelve work groups, each led by a different agency: dredging requirements, side channel openings, material and equipment needs, sediment and erosion control, fish and wildlife management, plan formulation, dredged material uses, recreation, water quality, commercial transportation, flood-plain management and public participation and information. The Corps led the dredging requirements and material and equipment needs work groups. Dennis Cin, St. Paul District chief of the Mississippi River Maintenance Section, chaired the dredging requirements group, and Wayne



The Dredge William A. Thompson: The Thompson is the largest dredge in the St. Paul District's fleet. After 67 years of service, the William A. Thompson will be replaced by a new dredge in 2005. (Photo courtesy Marc Krumholz, St. Paul District, Corps of Engineers)

Knott, an engineer for the district, led the material and equipment needs team.¹⁰

As it studied the river, GREAT I developed three different levels of goals: short-range or day-to-day decisions about the Mississippi; midterm, defined as those programs that could be completed within the study's time frame; and long-range, referring to the master plan of overall river management.¹¹ By 1978, GREAT I was reporting several accomplishments within its short- and mid-term goals. For one, it had helped convince the district to implement a reduced-depth dredging program in 1976 that ended the practice of dredging three or four feet below the required nine-foot depth. This change reduced the amount of material dredged from the Upper Mississippi from 1.6 million cubic yards to 650,000 cubic yards. For another, GREAT I recommended the Corps use advance site preparation to ensure that dredged material did not enter wetlands. Instead of depositing dredged spoils in backwaters, the Corps began placing them in seven pre-selected disposal sites on land, thus decelerating sedimentation in backwaters and creating recreational beaches at some areas. Finally, and perhaps most importantly, GREAT I facilitated communication among management agencies, the Corps and the general public, in large part through its Public Participation and Information Program, which held eleven public town meetings, nineteen special hearings and forty-one citizen executive board meetings about the Upper Mississippi.¹²

Between 1979 and 1980, the study's different work groups submitted their individual reports. In September 1980, GREAT I published its general report, using information compiled by the different work groups and containing eighty recommendations on how the St. Paul District could better manage the Upper Mississippi. Among its suggestions was that Congress provide the Corps with additional authority and funding to implement wildlife enhancement projects, that the Corps place dredged material at pre-selected sites and that the Corps alter side channels and make structural flow modifications to alleviate sedimentation in backwaters.¹³ When district officials saw the report, they did not entirely agree with its conclusions but decided to support them anyway. As Colonel Badger, district engineer from 1979 to 1982, related, "We can never fully agree with a multi-agency report. But I think the effort that went into it was good, the ideas were good, and they [were] trying to do the right thing."¹⁴ Other districts within the Corps, however, criticized St. Paul for allowing state and local entities to dictate how the Corps should conduct its affairs, and some officials even referred to St. Paul District employees as "ecofreaks" because of their environmental concerns.¹⁵



Dredging the Mississippi River: J. Skrede, a member of the crew on the Dredge Dubuque, positions pipe that will carry dredge material. (Photo courtesy of St. Paul District, Corps of Engineers)

To ensure that GREAT I's proposals were realized, Badger produced an implementation report, detailing what recommendations the St. Paul District considered to be of highest priority, how the district would execute these recommendations and what legislation and funding were needed. In this report, Badger discussed three possible future programs: the Basic Program, which would continue nine-foot channel dredging with only incidental considerations of fish and wildlife and recreation interests; the First Priority Program, which would consider fish and wildlife, recreation and water quality issues in nine-foot channel dredging; and the GREAT I Program, which would fully execute GREAT I's suggestions by significantly enhancing recreation and fish and wildlife opportunities. Taking the costs and benefits into consideration, Badger concluded the First Priority Program was the best plan to follow.¹⁶

To implement this program, Badger recommended that the St. Paul District receive \$3 million a year from Congress in order to protect the fish and wildlife habitat on the Mississippi from Minneapolis to Guttenberg. This money would go toward purchasing land rights from owners in order to build new dredge disposal sites and would also be used to slow down the sedimentation occurring in the Upper Mississippi's backwaters.¹⁷ As Badger stated, the plan enabled the district to "swim in the middle of the river" by balancing navigational interests and environmental concerns.¹⁸ This middle-ground approach, however, infuriated proponents of navigation. The Upper Mississippi River Waterway Association denounced it because it "literally puts confiscation of private lands within the grasp of environmentalists," while the U.S. Coast Guard believed it would eventually cause safety problems for river vessels. On the other hand, many environmental organizations, such as the Fish and Wildlife Service and the Minnesota Pollution Control Agency, generally supported the program as a step in the right direction, although they also claimed the Corps was not going far enough in environmental protection.¹⁹

By 1992, the St. Paul District had worked hard to execute the First Priority Program. The district had developed a forty-year dredged material placement plan for fifteen active dredging sites, taking into consideration economic, environmental, cultural and social impacts on each location. In addition, the district developed a comprehensive Channel Maintenance Management Plan which governed the placement of dredged material. It successfully reduced the average annual dredging volume from 1.6 million cubic yards to only 650 thousand cubic yards. In the opinion of one project manager in the St. Paul District, the reduced dredging was one of the major environmental changes the district made in the last quarter of the twentieth century.²⁰ At the same time, the district implemented the Weaver Bottoms Rehabilitation Project in 1987 to decrease sedimentation and restore habitat in that backwater lake, which was situated between Winona, Minnesota, and Wabasha, Minnesota. Although the Corps had deferred some of GREAT I's recommendations, it had taken significant steps toward alleviating the problems it considered most pressing, and it continued to develop plans for future mitigation efforts.²¹

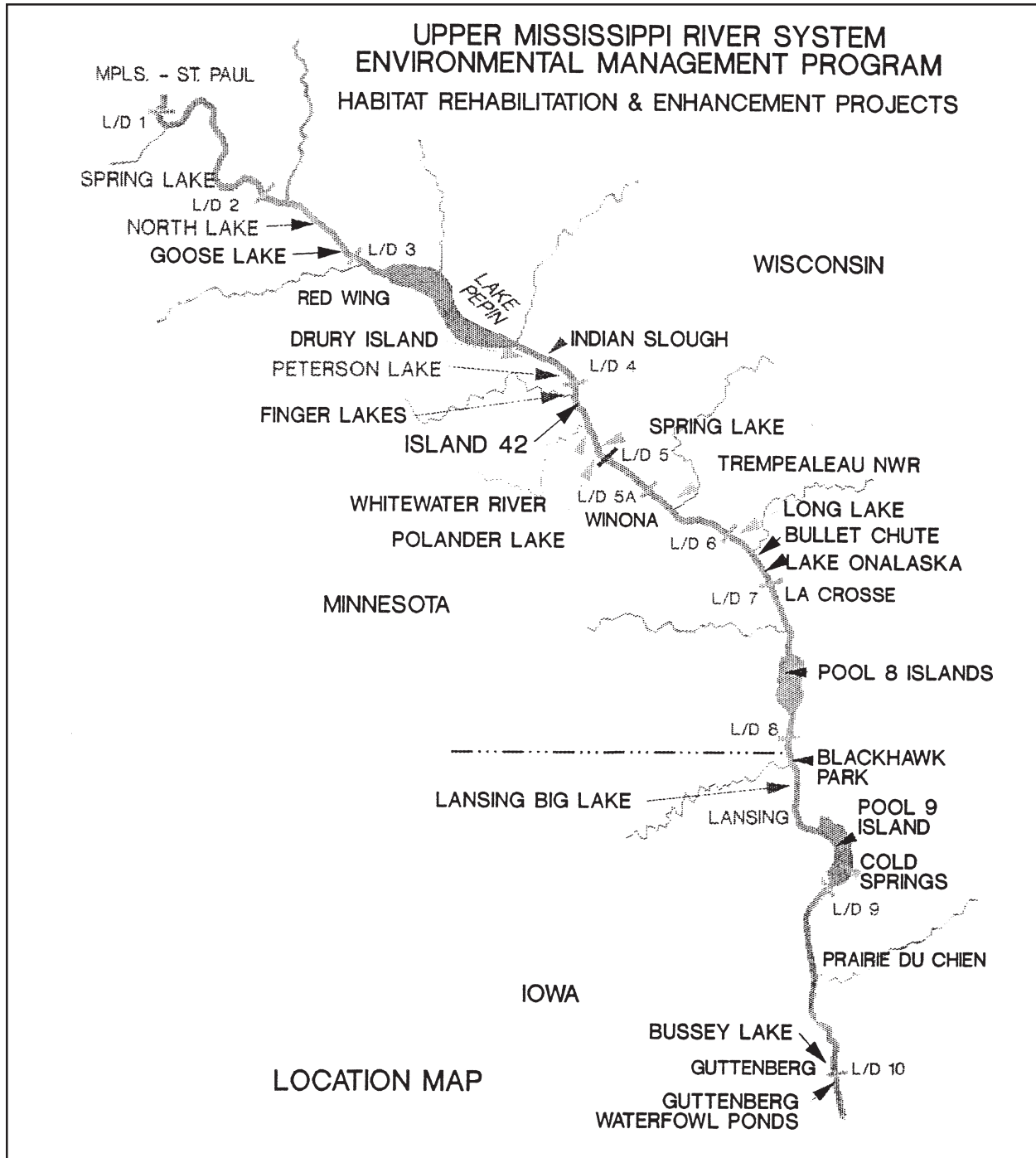
Complementing the GREAT I study was another analysis of the Upper Mississippi coordinated by the Upper Mississippi River Basin Commission. On October 21, 1978, President Jimmy Carter signed the Inland Waterway Authorization Act, which directed the commission to compile a Comprehensive Master Plan for the Management of the Upper Mississippi River System. This authorization resulted from a controversial Corps' proposal to replace Lock and Dam 26 at Alton, Illinois, with two new locks that could accommodate larger barges, thereby improving navigational use of the Upper Mississippi. Railroad interests feared the new locks would be a boon to barge companies. Environmentalists worried about the ecological effects of increased navigation. Both tried to prevent the construction of the locks through unsuccessful appeals to Congress and the courts. Although opponents could not halt construction of one of the locks, they were able to convince Congress to forestall building the second lock until a master study had been conducted.²²



Environmental Restoration: The first Upper Mississippi River Environmental Management Program completed by the St. Paul District included the backwater restoration in 197 of Island 42. The Corps excavated the channel in the center of the left photo. Pictured on the right is Island 42, a fill site. (Photos courtesy of Dan Wilcox, St. Paul District, Corps of Engineers)

According to the 1979 Annual Report of the Upper Mississippi River Basin Commission, the Comprehensive Master Plan intended to “seek a balance of present and future commercial navigation activities with the economic, recreational, and environmental objectives” of the river by specifically examining how an enlargement of navigational capacity would affect the Mississippi. After seeking public input, the commission adopted a Plan of Study on August 15, 1979, divided into four work teams – Resources and Transportation, Dredged Material Disposal Demonstration, Computerized Analytical Inventory and Analysis and Public Participation and Information – and commenced the study, hoping to complete it in four years.²³ On September 11, 1979, the Upper Mississippi River Basin Commission entered into a Memorandum of Agreement with the Corps, stating that the Corps would take an active role in developing the master plan.²⁴ The St. Paul District had the responsibility of determining the navigational carrying capacity of the Upper Mississippi, as well as evaluating the cost and benefits of depositing dredge spoil material in additional contained areas out of the floodplain.²⁵

The commission worked on the master plan for two years before issuing the report to Congress in late 1981. Upon its appearance, environmentalists were disappointed, believing that the plan sacrificed environmental interests for the sake of navigation. In the report, the Upper Mississippi River Basin Commission, with input from the Corps, concluded the second lock at Lock and Dam 26 was justified, but that Congress should also provide more than \$20 million for the next two years to control erosion along tributary streams and to protect backwater lakes and sloughs. The plan also called for the establishment of a ten-year environmental management program. The Sierra Club, however, saw these proposals as mere smoke and mirrors. “The commission’s tangible recommendations are for improving navigation on the river,” Jonathan Ela, Midwest representative of the Sierra Club, stated. “The environ-



Upper Mississippi River: Locations of habitat rehabilitation and enhancement projects conducted by the St. Paul District for the Upper Mississippi River System Environmental Management Program. (Map courtesy of St. Paul District, Corps of Engineers)

mental stuff they recommend is puff.” Rod Searle, chairman of the UMRBC, disagreed. The barge industry, he declared, was “not as happy as Mr. Ela would want us to believe. Since we don’t have everybody happy (with the plan), that leads me to believe that we’ve certainly accomplished something.” For the St. Paul District, the plan merely reinforced many of the recommendations offered by GREAT I, especially backwater rehabilitation and erosion mitigation, and showed the value of inter-agency planning on the Upper Mississippi. Although President Ronald Reagan abolished the Upper Mississippi River Basin Commission due to budget constraints soon after it issued its master plan, the commission, together with GREAT I, had developed recommendations that pushed the district toward formulating an environmental management program on the river.²⁶

Upper Mississippi River System Environmental Management Program

Indeed, largely because of the Upper Mississippi River Basin Commission’s report suggesting the establishment of a ten-year environmental management plan, Congress authorized the Upper Mississippi River System Environmental Management Program, or EMP, in the Water Resources Development Act of 1986. According to a report on the program, it was “designed to protect and balance the resources of the Upper Mississippi River Basin and guide future river management.” In order to accomplish this, five elements received emphasis: habitat rehabilitation and enhancement, long-term resource monitoring, recreation projects, the economic impacts of recreation and navigation traffic monitoring. In terms of resources, the habitat rehabilitation and enhancement and long-term resource monitoring were the largest components, while the recreation facets received no funding “due to a low federal priority.” Habitat rehabilitation and enhancement projects consisted of restoring river and floodplain habitats degraded by dredging or other activities, while the resource monitoring program called for biological and ecological research to determine what actions would best preserve the river’s ecosystem. Federal management of the program lay with the Corps, which coordinated with the U.S. Fish and Wildlife Service, the U.S. Geological Survey, the Upper Mississippi River Basin Association (an organization formed by Illinois, Iowa, Minnesota, Missouri and Wisconsin after the UMRBC’s demise) and representatives from five Upper Mississippi states. Although the North Central Division of the Corps chaired the project as a whole, the St. Paul District supervised habitat rehabilitation and enhancement in Minnesota and Wisconsin.²⁷

In order to implement the EMP, the St. Paul District consulted with river management agencies, the Fish and Wildlife Service and the River Resources Forum. The forum, first created in 1981 as the Channel Maintenance Forum (renamed the River Resources Forum in 1990), was an interagency team chaired by the Corps and the Fish and Wildlife Service to continue the coordination of channel maintenance and other river-related projects instigated by GREAT. Together, these groups evaluated different pools and areas along the Upper Mississippi and made a priority list of areas needing restoration. The first project completed by the St. Paul District included backwater restoration in 1987 at Island 42, located in Pool 5 of the Upper Mississippi be-

tween Locks and Dams 4 and 5 in Minnesota. Because backwater sloughs were not receiving enough water flow to maintain dissolved oxygen levels for fish, the district excavated a channel, built a structure to bring fresh water into the sloughs and dredged the area to create a deep-water fish habitat.²⁸

Another important undertaking included the Pool 8 Islands Habitat Project, involving a section of the river near Stoddard, Wisconsin. When the Corps completed construction of Lock and Dam 8 in 1937, it submerged the floodplain of Pool 8, initially enhancing the fish and wildlife habitat. But by the late 1980s, nearly 80 percent of the islands in Pool 8 had eroded, leading to increased wind fetch and turbidity. These conditions destroyed aquatic plants used by migrating canvasback ducks for food. In 1989, the St. Paul District, under the leadership of project manager Gary Palesh, began restoration on seven islands in Pool 8, reconstructing them from dredged material and protecting them with riprap and vegetation. The district also constructed six rockfill “seed” islands to try to stimulate growth and recommended periodic water drawdowns. The first two phases of construction were completed in 1999, and the project received the Minnesota Society of Professional Engineers’ Seven Wonders of Engineering award in 2002. According to St. Paul District hydraulics engineer Jon Hendrickson, “River currents and sediment deposits were returned to a more natural condition, wind-driven wave action was reduced and floodplain habitat was restored,” leading to a large increase in the number of canvasback ducks in the area.²⁹

By 2003, the district had finished twenty habitat restoration projects, many led by Palesh and Don Powell, with two more under construction and seven in the planning and design stage.³⁰ Although Congress originally authorized the EMP for only fifteen years, its life-span was extended indefinitely in the 1999 Water Resources Development Act, providing the district reported on its EMP activities every six years.³¹ In 1999, Powell and Palesh estimated the program had “brought environmental benefits to more than 10,000 acres of habitat on the Upper Mississippi River.”³² Indeed, the EMP had two major impacts on the St. Paul District: first, it provided steady work, and, second, it showed the district not only cared about the environment but could successfully implement projects to alleviate environmental damage. As District Engineer Colonel Richard W. Craig related in 1993, “We do [EMP] business very well ... We’re always going to do those types of environment-related activities very well because we have people here that are more interested in those types of projects than people in other regions of the country.”³³ Colonel Roger L. Baldwin, district engineer from 1988 to 1991, concurred, recognizing that both environmental and navigation interests had praised EMP projects. The EMP, he continued, “has demonstrated that we are capable of pulling off a major program that consists of many separable elements and have done so with a variety of constituencies and stakeholders in these individual projects.”³⁴

Locks and Dams 1-10 Rehabilitation

Despite the success of the EMP, however, some organizations still believed the Corps promoted navigation on the Upper Mississippi above environmental concerns. Whether or not this was an

accurate criticism, the Corps continued to maintain the nine-foot channel and its locks and dams. Indeed, beginning in the late 1970s, the St. Paul District undertook a major rehabilitation effort at Locks and Dams 1-10 on the Upper Mississippi. Because the Corps had first built these structures, which had fifty-year design lives, in the 1930s, they were all nearly fifty years old and in need of extensive maintenance in order to operate effectively for another fifty years. The first efforts began on Lock and Dam 1 in 1979 with five major objectives: improving hydraulic operation, improving structure stability, extending the lock's service life, providing more protection to the lock's foundation and improving recreational and aesthetic aspects.³⁵ One of the main problems, however, included completing the rehabilitation without disrupting barge traffic on the river. In order to fulfill this goal, the Corps mainly worked on the locks and dams in the winter, usually reopening the structures in May. According to Craig Hinton of the district's Dredging and Structures Section, this meant that the rehabilitation was "intensive work in a short time, under the worst conditions."³⁶



Facelift: Lock and Dam 5A after its rehabilitation. (Photo courtesy of Carl Gray, St. Paul District, Corps of Engineers)

In 1983, the district completed the renovations on Lock and Dam 1, rededicating the structure in June. That same year, it began rehabilitating the other locks and dams as part of a \$225 million effort. Throughout the 1990s, work was completed on various locks and dams but by 2003 some were still undergoing maintenance to be completed by the end of 2004. According to John Bailen, chief of the Engineering Division, the rehabilitation would allow Locks and Dams 1-10 to continue to operate efficiently for another 50 years.³⁷

The Midwest Flood of 1993

But not all were convinced that locks, dams and levees were appropriate for the Mississippi River. The Corps faced serious debates about its entire flood control function when a flood of historic proportions hit regions around the Upper Mississippi in the summer of 1993. Problems began when a low-pressure system stalled over the Midwest for two months, dumping large amounts of rain on the area. This started a chain reaction of flooding on the Upper Mississippi. In portions of the river stretching from the Quad Cities of Illinois to St. Louis, Missouri, water levels were at times more than three feet higher than previous records. On this stretch, the river broke through numerous levees constructed by agriculturists to protect rich farmland near the Mississippi, and water poured into surrounding areas, causing significant damage. Several roads, including major arteries such as Interstate 29 and U.S. 40 near St. Louis, closed due to flooding, while water inundated a treatment plant in Des Moines, Iowa, contaminating the drinking supply of 250 thousand people. The floods also submerged locks on the Upper Missis-

sippi, forcing the Corps to close the waterway to barge traffic and causing an estimated \$300 million in losses to the shipping industry. When the waters finally receded, at least fifty-two people were dead, 2,300 were injured, 56 thousand were homeless and property damage totaled more than \$10 billion.³⁸

Using complicated and technical comparisons of peak flood stage/discharge data and stage/discharge damage curves, the Corps claimed that its flood control projects and response efforts actually prevented more than \$8 billion in damages, but others believed the levees worsened the flood. According to an article in the *Engineering News Record*, several environmental groups argued that the construction of levees along the Mississippi River aggravated conditions “by restricting flow and raising water levels to unnatural heights.” They also created a false sense of security that encouraged communities to build in the floodplain.³⁹ The devastation wreaked by the river was proof, many said, that levees could not work alone. Therefore, politicians and environmental organizations called for a reexamination of flood control on the Mississippi. “If we continue down the old path, we do so at our own peril,” said Jim Tripp of the Environmental Defense Fund.

Representative Jim Lightfoot (R-Iowa) echoed these sentiments. “The corps is very good at what they do,” he admitted. “But quite frankly, I think their book needs to be rewritten.”⁴⁰ Bill Bertrand, chairman of the Upper Mississippi River Conservation Committee, believed the Corps needed to implement “ecosystem planning,” whereby wetlands would be restored, levees would be removed and the river would be returned “to a more natural condition.”⁴¹

The Corps defended levees against these attacks, believing its flood control system on the Mississippi River truly did protect communities. In this system, reservoirs restrained tributary flows while smaller levees protected agricultural land and urban levees and floodwalls shielded city centers. Reservoirs were designed with enough storage capacity to offset some of the flood stage increases



Flooding: St. Peter, Minnesota, 1993. (Photo courtesy of St. Paul District, Corps of Engineers)

caused by the channelization of the river, while agricultural levees were constructed to overtop during heavy flooding to relieve pressure on urban levees.⁴² According to the Corps, then, the real problem in 1993 was not its flood control system but a phenomenal natural event. “The paramount purpose of the levee system is to prevent loss of life,” Gene Gamble, a Corps’ spokesman, related. “That’s what they did well.”⁴³ Gary L. Dyhouse, a St. Louis District hydrologist, agreed. “There are many reasons for changes in a flood elevation besides levees,” he claimed. “Contrary to the beliefs of some, the Great Flood of 1993 ... was not caused by levees.” Instead, Dyhouse continued, unprecedented rainfall triggered flooding and made water levels rise to extraordinary heights. “The Great Flood of 1993 was probably the largest flood seen at St. Louis since the first European settlers entered the area in the 1700s,” he concluded.⁴⁴ Yet the Corps also realized that levees alone could not adequately protect river communities and lands. Besides, they were not always aesthetically pleasing. “A wall all along the Mississippi River is not something a lot of people would support,” Colonel Richard Craig, district engineer of the St. Paul District, admitted.⁴⁵ Therefore, the Corps reiterated that nonstructural solutions such as relocation, floodplain zoning and land-use planning were, in the words of Dyhouse, “good companion measures that should be included with traditional structural flood reduction measures like levees and reservoirs.”⁴⁶ The Corps also declared it would not finance the repair of any levees destroyed by the flood that local sponsors had not properly maintained.⁴⁷

Because of extensive flood damages, criticisms arose about federal financial assistance to natural disaster victims. When the federal government intervened in emergencies, taxpayers ended up paying for cleanup and repairs to private residences, in part because the federally funded National Flood Insurance Program, first established in 1968, covered areas at risk. This irritated Americans such as Richard Reeves, a syndicated columnist who wondered why citizens had to pay “higher taxes and insurance premiums to protect property that is uninsurable under any rational system.”⁴⁸ Such complaints dovetailed with cries for better floodplain management and for a revised flood insurance program. In part because of these criticisms, Congress ordered the North Central Division to conduct a study on flood control on the Upper Mississippi. David Loss, a project manager in the St. Paul District, chaired this examination, and the resulting report reiterated that the federal government needed to use other flood prevention methods besides levees, including purchasing land in the floodplain and improving flood insurance.⁴⁹

Additional studies reached the same conclusions. A post-flood examination conducted by the North Central Division explained that although floods could not be “100 percent controlled,” they could be “greatly reduced and better managed with structural and non-structural improvements.”⁵⁰ Likewise, the Interagency Floodplain Management Review Committee appointed in 1994 to investigate existing floodplain and watershed management programs on the Upper Mississippi, recommended the implementation of policies that focused first on “inappropriate use of the floodplain;” second, on “minimizing vulnerability to damage through both structural and nonstructural means;” and, third, on “mitigating flood damages when they do occur.” It also



Navigation: Several barges being locked through Lock and Dam 10 in Guttenberg, Iowa. (Photo by Shannon Bauer, courtesy of St. Paul District, Corps of Engineers)

recommended that the National Flood Insurance Program mandate floodplain management before allowing communities to participate in the program. In addition, the Interagency Floodplain Management Review Committee proposed that federal agencies, including the Corps, increase floodplain management education and outreach, but hardly any of the committee's recommendations were ever legislatively enacted.⁵¹

Upper Mississippi River-Illinois Waterway System Navigation Study

No matter what solutions the Corps proposed, many environmentalists remained convinced the organization would continue to restrict rivers to the detriment of the environment. Accusations surrounding a Corps' navigation study in the late 1990s only reinforced this perception. As part of its navigation planning function, the Corps began two separate reconnaissance studies in 1990 on the Illinois Waterway and the Upper Mississippi River in order to identify sites and structures needing navigation improvements. In 1993, the Corps combined these two reconnaissance studies into a system feasibility study, which examined what the Corps could do on the Upper Mississippi and the Illinois to relieve traffic congestion and delays.⁵²

Congestion on the Upper Mississippi had been a worrisome problem for years. As increasing numbers of barges traversed the river, delays became commonplace at many locks and dams. Part of the problem was that most of the locks on the Upper Mississippi were only 600 feet long, while most towboats pushed lines of fifteen barges approximately 1,200 feet long. This meant that when a tow approached the lock, it would have to be dismantled into two separate tows in order to pass-through, causing a delay of roughly an hour. Of special concern to the Corps were Locks 11 through 25. Because of regular delays on these sixteen locks, the navigation study specifically examined whether or not it was feasible to increase their length to 1,200 feet. The Corps also explored whether or not to expand seven locks close to St. Louis.⁵³

The feasibility study, entitled the Upper Mississippi River-Illinois Waterway System Navigation Study, lasted into the twenty-first century, costing about \$50 million. The St. Paul District participated in the study, along with the Rock Island and St. Louis districts, under the supervision of first the North Central Division and then the Mississippi Valley Division. By 1998, the economics work group, chaired by Donald Sweeney of St. Louis District, determined that the costs of lock expansion, which approached \$1 billion, far outweighed the benefits. The group, therefore, recommended that enlargements not occur. Sweeney claimed that after his team issued this finding, he was relieved from his duties and replaced by another economist. Eventually, he argued, the Corps developed a draft report showing that large-scale expansion of the seven locks *was* economically viable. Sweeney charged senior Corps' officials, including Major General Russell L. Fuhrman, deputy chief of engineers and deputy commanding general of the Corps; Major General Phillip R. Anderson, Commanding General of the Mississippi Valley Division; and Colonel James V. Mudd, district engineer of the Rock Island District, with deliberately altering data in order to produce this favorable benefit-cost analysis. Sweeney officially filed an affidavit with the U.S. Office of Special Counsel detailing these charges, and the Office of Special Counsel instructed the Department of Defense to investigate. In November 2000, the Inspector General of the Army issued a report that substantiated some of Sweeney's charges, specifically that Mudd improperly told Corps' employees to use a lower N-value (a variable measuring how much consumers would be willing to pay for better barge transportation) than was warranted, and



Repairs: Richard Princko and Joe Kupietz, tender boat operators at the maintenance and repair unit in Fountain City, Wisconsin, remove a clamp bar and bottom seal during dewatering of the lock at Lower St. Anthony Falls, Minneapolis in 2003. (Photo by Shannon Bauer, courtesy of St. Paul District, Corps of Engineers)

that Fuhrman and Anderson told subordinates that the Corps should act as an advocate for navigational interests. The report also found that an attitude of “Grow the Corps” existed, whereby divisions and districts were pressured to deliver projects.⁵⁴

After the Inspector General released his findings, environmental groups expressed anger, but not amazement, with the Corps’ conduct. Even before Sweeney delineated his suspicions, an article in *Forbes* magazine argued that “it is foreordained that the Corps will ask for new locks, and will say that without them the competitiveness of U.S. grain exports is at risk.”⁵⁵ An editorial in the Minneapolis *Star Tribune* agreed. “The remarkable thing” about the Inspector General’s findings, it concluded, “was how plainly the Corps’ conduct on the Mississippi and Illinois rivers locks project illustrates what so many have suspected but been unable to prove.”⁵⁶ Likewise, Ted Williams, in an essay in *Audubon*, saw the controversy as just another chapter in an ongoing history: “The Corps’ military pooh-bahs have traditionally used trick arithmetic to justify environmentally hurtful, make-work projects.”⁵⁷ Williams’ perception was that the Corps routinely manipulated its benefit-cost analyses to validate projects it wanted.

This opinion was nothing new. Since the 1970s critics had disparaged the Corps’ benefit-cost system, which used various figures to produce a ratio comparing the benefits accruing from a project with the amount of money expended. According to the national economic development criterion employed by the Corps, if a project had a ratio of 1.0 or greater (meaning that for every dollar spent, benefits greater than a dollar resulted), it was economically justified. But in the 1970s, economist Robert H. Haveman of the University of Wisconsin argued that two-thirds of the Corps’ projects could not “pass a rigorous and correct cost-benefit test.”⁵⁸ Others believed the benefit-cost process was inherently flawed because of the discount rates used in the calculations. Since water projects usually stretched over long periods of time, the Corps, like other government agencies, used discount rates, usually a figure lower than the current market interest rate, to equalize future dollar values with present rates. As Stephen A. Thompson of Millersville University in Pennsylvania explained, “Public spending uses a discount rate lower than that used by private markets. Low discount rates favor capital-intensive projects that produce benefits many years into the future; this is precisely the character of most water projects.”⁵⁹ Thus, according to journalist Steve Slade, “The Corps’s outdated benefit-cost type of analysis is consistently biased toward endorsing proposed construction projects.”⁶⁰ Attorney Michael S. Baram extended this argument, stating that “by manipulating the discount rate, assigning arbitrary values to identified costs and benefits, excluding costs that would tilt the outcome against the preferred option, and using self-serving assumptions about distributional fairness,” the Corps could easily justify any desired project.⁶¹

Another problem with benefit-cost analysis was the difficulty of making an economic estimate on environmental effects. As Ted Williams questioned about the Upper Mississippi River-

Illinois Waterway System Navigation Study, “What, I wondered, is the dollar value of the two dozen bald eagles ... [or] the pileated woodpecker” that would be displaced by the lock expansion? Williams, quoting a study performed for the Fish and Wildlife Service in 1999, placed “the economic contribution of fishing, hunting, wildlife viewing, and sightseeing along the Upper Mississippi at \$6.6 billion per year,” but such figures were difficult to verify.⁶²

In some ways, then, the controversy over the Upper Mississippi River-Illinois Waterway System Navigation Study was part of an ongoing disagreement over the benefit-cost system itself. Even though the Inspector General’s report castigated the Corps, it recognized the subjectivity of the benefit-cost process and supported some of the changes the Corps had made in its economic analysis of lock construction because of this.⁶³ But the damage had been done, and the Upper Mississippi River-Illinois Waterway System Navigation Study came to a halt in 2000 while the National Academy of Sciences’ National Research Council conducted an independent review. On February 28, 2001, the National Research Council issued its findings and recommended the study broaden its scope to focus on both environmental and economic factors. Acting on these recommendations, the study acquired a new name, the Restructured Upper Mississippi River-Illinois Waterway Navigation Study, and began again in the summer of 2001, with a projected completion date in 2004.⁶⁴

Even though no one from the St. Paul District was implicated in the scandal, the district, as well as the Corps as a whole, still learned some lessons from the process. Although the benefit-cost manipulations were disturbing, the charges that the Corps was primarily interested in navigation and as an organization concentrated on getting work for itself regardless of the cost to taxpayers was perhaps more damaging. Some Corps’ personnel clearly needed to change their perspective, but in the St. Paul District, which had traditionally been more environmentally conscious than other Corps’ units, the issue, according to Colonel Kenneth Kasprisin, district engineer from 1998 to 2001, was more about projecting an accurate image than about revising its benefit-cost analyses. “I think that the Corps has a very high integrity,” Kasprisin asserted. “I think that we take a lot of pride in what we do.” The problem, he continued, was conveying that impression to the public, and he called on the Corps in general to improve its efforts “to tell our story of what it is that we do to help the communities.”⁶⁵

While the Corps continued to address criticism of its handling of the Upper Mississippi River, the 2002 publication of an interim report by the Restructured Upper Mississippi River-Illinois Waterway Navigation Study began to rectify the challenging issues in the original study. “A collaborative process has been applied in restarting the restructured navigation study,” the report stated, and this process consisted of consulting with “other Federal agencies, state agencies, the public, and economic and environmental non-governmental organizations” about how “to give equal consideration of fish and wildlife resources and navigation improvement.”⁶⁶ For the duration of the study, this collaboration was to continue. The question remained as to how the Corps would deal with the problems associated with

benefit-cost analyses, but, as the successes of GREAT I and the UMRBC master plan showed, consistent coordination with other agencies would help.

Endangered Species – *Lampsilis higginsii*

As the Corps dealt with the problems arising from the Upper Mississippi River-Illinois Waterway Navigation Study, the St. Paul District faced difficulties from another source: mussels on the Upper Mississippi. The district became concerned with mussels because some varieties were endangered species and because an exotic species, the zebra mussel, threatened to destroy the native population. In 1973, Congress passed the Endangered Species Act, which required federal agencies to ensure their actions did not harm any endangered species or its habitat. This complicated matters for the St. Paul District because of the presence of *Lampsilis higginsii*, or the Higgins' eye pearlymussel, in several waterways under its jurisdiction, including the Upper Mississippi and St. Croix rivers. Because of a decrease in abundance and range of the Higgins' eye, the Fish and Wildlife Service listed it as an endangered species in 1976.⁶⁷

That same year, various individuals and agencies expressed concern for the Higgins' eye mussel. When the St. Paul District held public hearings on its nine-foot channel maintenance dredging, for example, the Fish and Wildlife Service conveyed its trepidation about the effects of this action on the Higgins' eye, especially in the eastern channel at Prairie du Chien, Wisconsin. In response, the district held a meeting with commercial clammers, Prairie du Chien's city council and representatives from the State of Wisconsin, as well as the Wisconsin Department of Natural Resources and GREAT, to determine exactly where in the east channel the mussel resided. The group discovered that, although mussel beds existed in the southern part of the channel, they were not known in the northern part. Based on this information, the district decided to dredge the east channel from the north, rather than the south. Marian Havlik, a Wisconsin resident who had educated herself about the Higgins' eye, objected to this effort, believing it would still disrupt the mussel's habitat. The Corps, however, believed that because of a slow river current, the dredged material could settle before reaching the mussel beds. Besides, the mussels had already survived heavy periods of natural siltation due to flooding, and the short duration of the dredging would not harm them. All interested agencies and commercial clammers accepted the district's revised plan.⁶⁸

But after the dredging, Havlik went through the spoil and found, in her own words, "hundreds of Higgins' Eye shells."⁶⁹ Angry that the St. Paul District had not listened to her, Havlik wrote President Jimmy Carter and United States representatives and senators from Wisconsin and Minnesota, protesting that the Corps had knowingly violated the Endangered Species Act by not conducting a thorough survey of Higgins' eye mussels before dredging.⁷⁰ Perhaps exasperated at the outcry Havlik made, some Corps' personnel began referring to her as "that clam lady," but her actions helped the St. Paul District become more aware and knowledgeable about the Higgins' eye mussel. Before this incident, Havlik



Endangered species: (Left) Male and female Higgins eye mussels. (Photo by Mike Davis, Minnesota Department of Natural Resources) (Right) Nonnative species zebra mussels without infestation next to native infested zebra mussels. (Photo courtesy of St. Paul District, Corps of Engineers)

related, “There was no one in the Corps who could identify a mussel species.” After her protests, she said, “The Army Corps realized that never again could it dredge a channel without first doing a survey of mussel species in the path of the dredge boat.”⁷¹

As the district continued to discover Higgins’ eye mussels in its dredging areas, it developed a greater concern for them. In 1977, for example, the district discovered the half-shell of a dead clam in dredged spoils from the Minnesota River. Although the clam could not positively be identified as a Higgins’ eye, the district stopped work for two days while a malacologist investigated. Such inconveniences led James Braatz, a St. Paul District spokesman, to declare in 1980, “The problem with the Higgins’ Eye is that it keeps cropping up where we want to work.” To solve the Higgins’ eye issue, the district advocated the establishment of specified areas outside of dredging sites where the species could be placed and protected. The Fish and Wildlife Service investigated this possibility, but took no action in the 1980s.⁷²

In the 1990s, anxiety about the mussel increased after the St. Paul District learned that an exotic mussel species, *Dreissena polymorpha*, or the zebra mussel, had invaded the Upper Mississippi River. The zebra mussel, usually around one inch long, is native to central Asia, but migrated to Europe in years past. In 1985 or 1986, commercial barges with the mussel attached entered the Great Lakes, unintentionally leaving the creature behind. Thereafter, the mussel was carried to the Mississippi River by recreational and commercial crafts. Once in the Mississippi, the mussel created three problems: first, it used strong threads to attach itself to any hard substrate, including water intakes, pipes, valves, buoys, screens and other underwater structures, causing clogging and sinkage; second, its large numbers could ruin fish spawning habitat; and third, it could potentially eliminate the Higgins’ eye and other native mussels by competing for food and attaching to their shells, thereby preventing them from migrating or burrowing.⁷³ The St. Paul District initiated a monitoring process of the zebra mussel at its locks



Mussels: Corps' biologists relocate immature Higgins eye clams pursuant to the Biological Opinion. Left to right: Randy Urich, Dan Kelner and Dennis Anderson. (Photo by Shannon Bauer, courtesy of St. Paul District, Corps of Engineers)

and dams in 1992, but by the end of the decade, the population of the organism had exploded on the Upper Mississippi.⁷⁴

In 2000, the Fish and Wildlife Service issued a Final Biological Opinion for the operation and maintenance of the nine-foot channel navigation project which concluded that because of barge movement, the project would continue to facilitate the growth of zebra mussel populations, thereby diminishing the survival chances of the Higgins' eye. The Service recommended the Corps conduct a study as to the feasibility of relocating populations of the Higgins' eye mussels to stimulate their population growth, and a reconnaissance/feasibility study commenced. In April 2002, the St. Paul District released a draft relocation plan under the direction of biologist Dennis Anderson. This report proposed establishing ten sites throughout Minnesota, Illinois, Iowa and Wisconsin where the Corps could place Higgins' eye mussels in order to ensure that at least five new populations survived. The ten-year plan, estimated to cost \$2.66 million, also called for raising juvenile mussels on certain fish species at hatcheries and then transplanting these mussels to the relocation sites.⁷⁵ The next decade would show whether or not this plan enhanced Higgins' eye populations, but the Corps was optimistic. Meanwhile, the St. Paul District worked on a zebra mussel reconnaissance study, but what solutions this proposed remained to be seen.

For the foreseeable future, the zebra mussel, in the words of one district official, would continue to be a “multi-million-dollar pest” to the Corps.⁷⁶

Conclusion

By 2003, civil works projects on the Upper Mississippi River had produced numerous opportunities for the St. Paul District to show its concern for the environment and to demonstrate its cooperation with federal, state and local entities. Although the Upper Mississippi River Navigation Study and the Midwest Flood of 1993 produced new concerns about the Corps’ commitment to environmental values, the St. Paul District’s work on commissions, such as GREAT and the Upper Mississippi River Basin Commission, together with its implementation of the EMP and its efforts to preserve the Higgins’ eye mussel, evinced the district’s environmental awareness. Events on the Upper Mississippi showed that balancing the interests of different parties was difficult and controversial, and that most of the time the Corps could not satisfy all viewpoints. The key, according to District Engineer Colonel William Badger, was to “swim in the middle of the river” and hope that a moderate approach appeased some of the concerns.⁷⁷

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